PBDE End-of-Life Advisory Committee
Meeting #2 Notes
June 13, 2006

The second meeting of the PBDE End-of-Life Advisory Committee was held on June 13, 2006 at Bates Technical College in Tacoma, Washington. A copy of the meeting agenda is included as Attachment 1* - Meeting Agenda on the Ecology PBDE Web Page: http://www.ecy.wa.gov/programs/eap/pbt/pbde/PBDE_ac-2.htm. A copy of the meeting attendee signup sheets (Attachment 13*) and other meeting handouts discussed in these meeting notes can be accessed at the same web address.

The following advisory committee members attended the meeting:

Tiffany Hatch, Seattle Goodwill
David Stitzhal, Northwest Product Stewardship Council
Vicki Austin, Washington Refuse & Recycling Association
Richard Gimer, Carpet Cushion Council
Bob Schille, Waste Management
Jody Snyder, Land Recovery Inc.
Jim Jakubiak, Schnitzer Steel
Nancy Atwood, American Electronics Association
Randy Ray, Pacific Seafood Processors Association
Kyle Dorsey, Northwest Biosolids Management Association
Greg Dana, Alliance of Automobile Manufacturers
Craig Lorch, Total Reclaim
Nancy Dickeman, Washington Physicians for Social Responsibility
Laurie Valeriano, Washington Toxics Coalition
Mo McBroom, Washington Environmental Council
Dan Thompson, City of Tacoma
Gary Smith, Independent Business Association
Susan Landry, Bromine Science and Environmental Forum

The following Ecology staff presented information during the meeting:

Carol Kraege
Cheri Peele

The following representatives from government agencies attended the meeting:

Cullen Stephenson, Department of Ecology
Joanne Bonnar Prado, Department of Health
Mike Gallagher, Department of Ecology
Madeline Beery, Department of Health
Rob Duff, Department of Health

The following additional stakeholders and members of the public attended the meeting:

Brad Tower, Bromine Science and Environmental Forum
Robert Ambrose, Carpet Cushion Council
Earl Tower, Schnitzer Steel
Glenn Reed, Pacific Seafood Processors Association
Jerry Smedes, Smedes & Associates
Suellen Mele, Washington Citizens for Resource Conservation
Nancee Wildermuth, Alliance of Automobile Manufacturers
John Rodgers, Land Recovery Inc.

Marc Daudon facilitated the meeting and Nanda Blazej took notes.

Convene, Introductions & Overview

The meeting facilitator, Marc Daudon, welcomed the advisory committee members and members of the public to the second meeting of the PBDE End-of-Life advisory committee. Advisory committee members, representatives of government agencies, and additional attendees introduced themselves.

Marc explained that the purpose of this second meeting was to provide additional information on PBDEs and end-of-life issues, review the Department of Ecology's (Ecology) approach, and discuss high priority end-of-life practices. At the first meeting there appeared to be some uncertainty around Ecology's approach to end-of-life issues. Today's meeting provided a forum for discussing Ecology's approach in more depth and for everyone to become clear on current end-of-life practices and issues.

Marc reviewed the consultative process guidelines. He reminded the committee that the ground rules and guidelines were based on feedback from interviews he had conducted with committee members prior to the first meeting. He also reminded the committee that in this process, Ecology is responsible for the final product and decisions. Ecology is asking for the committee's input to help come up with decisions. The three main roles of the committee are to provide information; share stakeholder perspectives; and contribute to identifying solutions and preferred outcomes. Marc explained that several members were going to speak throughout the day about how various materials that potentially contain certain levels of PBDEs, such as electronics and automobiles, are currently handled at the end of their lives.

The advisory committee did not have any questions or concerns about the process guidelines or ground rules.

Carol Kraege (Ecology) reviewed the agenda for the day. She also acknowledged that there was concern about the quality of food from the first meeting so they made changes that she hoped would be agreeable for today's participants. The day's agenda was shifted around slightly in response to a few members' requests.

Background Information

Carol Kraege provided a brief background presentation (Attachment 3* - The PBDE CAP, the E-Waste bill and relationship to End-of-Life Process/Review of scope and desired outcomes of the EOL process) that highlighted concerns expressed at the first end-of-life committee meeting, (held on March 15, 2006), and Ecology's activities since the first meeting. Since the first meeting, Ecology has prepared a draft white paper summarizing the information available on the relationship between PBDEs and end-of-life processes. Ecology has also decided to focus on four end-of-life practices.

Advisory committee members had the following questions on Carol's introductory presentation:

- **When will the draft white paper be released?** One member asked when the committee would be able to see the draft white paper. Ecology responded that as soon as it is finished, most likely in a couple of weeks, she would send

the draft around to committee members. Marc reminded the committee that all materials distributed at today's meeting will be posted on Ecology's website within a couple of days.

Joanne Bonnar Prado, Washington State Department of Health (Health), then presented an overview of the relationship between human health and PBDEs to the committee (Attachment 2* - Overview of PBDEs, human health & exposure pathways). Joanne discussed what Health knows or believes to be the health effects from PBDE exposure. She started with a brief description of the three types of PBDEs in question: penta, octa and deca. The two biggest health concerns from exposure to PBDEs as a whole are brain development alterations and interference with the reproductive system. Health concerns such as liver effects or cancer are less well-established outcomes from PBDE exposure as are brain development and reproductive effects. Infants and children are more susceptible to effects from PBDEs because of their relative size and behaviors. Breast milk is one potential exposure pathway, although, as a public health advocate, Joanne needed to express sentiments that breastfeeding is still considered the healthiest way to feed babies. As far as pathways are defined, medical and public health fields think of pathways as how a substance enters a body, and there are three main routes: respiratory, ingestion and dermal absorption. Webster's defines pathway as "the route or course along which something moves." An exposure pathway is considered complete if it contains:

1. Source (PBDE containing products)
2. Environmental media and transport mechanism (Does it migrate through soils, water or air from landfills or incineration process? Does sludge move it to fields, food, etc?)
3. Point of exposure (Home carpet, worksite, table or car)
4. Route of exposure (Breathe dust, eat food, absorb through skin)
5. Receptor population (Us)

Joanne explained that, in this particular advisory committee process, Ecology is focusing mostly on the second exposure pathway component, "environmental media and transport mechanism." Joanne then briefly described what is known about different pathways – indoor environment, outdoor environment, food, and occupational settings – and shared Health's conclusions. For both indoor and outdoor exposures, there is little data about what products are contributing to PBDEs in the environment. Health's conclusions are that children and the developing brain are sensitive to PBDEs, and that reducing exposure involves a combination of solutions such as changing individual behaviors to keep dust levels low; choosing green products; implementing pollution prevention strategies; and safely managing disposal and recycling of consumer products at the end-of-life.

Advisory committee members had the following comments and questions on Joanne's presentation:

- **Can Health quantify what they mean by "highly toxic" or "less toxic" in its descriptions of penta, octa and deca?** Health responded that they do not have numbers to quantify toxicity. They are coming from a public health advisor perspective, not from a toxicology standpoint.
- **One member stated for the record that the Bromine Science and Environmental Forum disagrees with Health's concerns and findings.**
- **Are all health effects discussed in the presentation related to PBDEs or could they be from other toxins?** Health responded that they were discussing effects from all neurotoxic chemicals, not just PBDEs.

- **What is Health using for reference doses in its data?** One committee member expressed concern with the statement about dust being a major exposure pathway of PBDEs for children in indoor environments. He stated that science of exploring this pathway is not yet complete and asked for Health to provide more backup data. Health responded that they are currently reviewing three national studies that include reference doses, including the national tissue advisory based on PBDEs. There is not a lot of data to review. One committee member commented that it is not realistic to just look at doses of deca, penta or octa by themselves because humans are exposed to many different toxins at the same time.
- **Are there more resources available regarding occupational exposure than what was given in Health's presentation?** Health responded that the Department of Labor and Industries has access to more occupational sources tracking PBDEs. Health will pull additional resources together for the committee.
- **Are there other possible food pathways besides seafood and beef as indicated in Health's presentation?** One committee member asked if vegetables are also considered a potential food pathway in addition to seafood and beef. Health commented that the Department of Agriculture is not currently testing for PBDEs, but that she cannot guarantee that PBDEs are not in other products.
- **Concern with science and data presented by Health.** Multiple committee members expressed concern with the science that Health presented; stating that much data is lacking and that many connections are not necessarily supported by science. One member did not think it was appropriate to show a slide with neurotoxicological issues if there is not firm science backing up the connection to PBDEs. One committee member stated that on the "higher risk groups" slide, Health indicates that workers in occupational settings dealing with foam/rubber may have elevated levels of PBDEs. He expressed his concern with this finding and stated that there is no available information that suggests PBDEs are in rubber cushion. Marc concluded the session by reiterating that there are many requests from the committee for more data sources. He stated that it would be very helpful for Health and Ecology to compile and share additional data with the committee.
- **Suggestion to keep information as regionally specific and relevant as possible.** One committee member commented that some of Health's slides were broad and confusing. He stated that studies he has read about PBDE levels in fish in particular vary considerably depending on where the fish comes from. He encouraged Health to compile regional data as much as possible, in terms of contamination levels in fish for example, because the broader information can actually affect the fish industry's livelihood. He also commented that he would like to see Health include positive health benefits of fish when giving presentations such as this one. Health responded that they try very hard to give balanced messages about fish and do encourage the public to eat as much fish as possible. Health has a campaign that encourages "eating fish, being smart and choosing wisely." Health also stated that there is only one fish advisory in North Carolina that is based on PBDEs; other fish advisories are about PCBs. Health reiterated that they strongly encourage fish consumption through many of their programs related to healthy living.

After Joanne's presentation, Carol reviewed additional background information about

Ecology's Chemical Action Plan (CAP) and the recent Electronics Waste (E-waste) legislation. Ecology put together this presentation to explain how they understand end-of-life links to the CAP and E-waste bill and hoped that after the review they could move towards problem-solving conversations.

Carol began with an overview of the CAP (refer back to Attachment 3*), which was a two-year stakeholder process that included an assessment of alternatives to PBDEs, cost-benefit analysis and extensive literature review. Carol explained that the CAP focused primarily on electronics because research at that time showed that deca was primarily used in electronics. Ecology collected data and reviewed literature to find data on toxicity and PBDE pathways in a global sense; not just for Washington State. The key recommendations from the CAP were that penta and octa should be banned immediately and that deca should be banned provided that safer, effective and affordable alternatives are available. Another key recommendation was that Ecology should establish appropriate disposal practices for products containing flame retardants. The end-of-life advisory committee was convened because of this recommendation about establishing appropriate disposal practices.

Carol then summarized the E-waste bill that passed earlier this year and will go into effect January 1, 2009. The bill states that manufacturers will fund and provide programs throughout the state that offer free collection and recycling of computers and televisions. Ecology expects that all available E-waste will be recycled under this system. "All available" E-waste refers to when people are ready to dispose of what they currently have. There is no exact count of electronics that will be accommodated by this new system, but Cullen Stephenson, Ecology's Program Manger for the Solid Waste and Financial Assistance Program, commented that 1 million units are sold per year in the state so the disposal potential is some percentage of that number.

Methodology and Approach

Carol followed the background information presentation with a review of Ecology's methodology and approach for addressing end-of-life issues (refer back to Attachment 3*). She explained that, based on the recommendation that Ecology should establish a process to evaluate and determine appropriate disposal and recycling practices for products containing PBDEs, they decided to focus on four priority areas:

- **Auto fluff** (auto shredder residue) – The literature shows that in the past significant amounts of penta and deca have been used in automobiles. This is a contained, identifiable waste stream that Ecology would like to explore further.
- **Electronics recycling** – A large portion of deca has been used in electronics.
- **Landfilling / incineration** - Where everything is going to end up eventually.
- **Wastewater treatment / biosolids** – Ecology needs more data about the possibility of removing PBDEs through the treatment process.

Carol explained that these four focus areas mean Ecology will not be spending a lot of time on carpet or upholstery issues. Ecology had to narrow the scope of this project and decided to build from information they already had. Ultimately, PBDE end-of-life issues are large and difficult to fully understand. Carpet and upholstery issues will require a different approach. Ecology's expected outcome from the end-of-life advisory committee process is a set of recommendations to Ecology, Health and local health departments that:

- Encourage and preserve recycling in Washington State; and
- Reduce the release of PBDEs to the environment from disposal and recycling practices.

Ecology determined that there are two approaches to determining best end-of-life practices: a standards approach and a best available technology approach. The standards approach includes collecting samples and comparing the measured concentrations with a standard limit not to be exceeded. Problems with this approach include the reality that there are no state or national standards for PBDEs at this time and that very little data are available on releases. Standards are time consuming and resource intensive to establish. The best available technology approach comes from the perspective that, because PBDEs are PBTs, any reduction in PBDE releases is considered beneficial. This approach involves examining current end-of-life practices, recommending cost effective best management practices (BMPs) and establishing a baseline of information that can then be monitored. Ecology thinks this approach will have more likelihood of success than a standards approach.

Advisory committee members had the following comments and questions on Ecology's methodology and approach:

- **Has anyone quantified the volume of materials that the state has purchased that may contain PBDEs?** Carol responded that she is not aware of any data that measures the amount of products purchased by the state that may contain PBDEs, although it is a good idea to gather that information.
- **What is the status of EPA's development plan for E-waste processing BMPs?** A committee member asked if anyone knew about EPA's progress in developing processing BMPs for E-waste. Another member commented that it will be a long time before we see anything substantive from EPA's stakeholder process. Ecology suggested that this committee should not hold themselves to federal standards and should continue moving forward as much as possible.
- **Why did Ecology combine landfilling and incineration into one priority focus area?** One member commented that landfilling and incineration seem to be two very different processes with different potential for releasing PBDEs into the environment. Ecology agreed and stated that they will not spend a lot of time on incineration; they will focus more on landfilling. Ecology added that the state's one incineration facility already controls for dioxins (and therefore PBDEs) so they are not as concerned with this disposal method. Another committee member officially disagreed with Ecology's statement that incineration should not be as high of a concern.
- **Confusion with the scope of the project.** Multiple committee members expressed confusion with Ecology's scope. One member asked if the committee was also going to look at exposure pathways such as breast milk and the indoor environment instead of just the end-of-life of PBDE-containing products. She stated that she wants to make sure Ecology is looking at the whole picture. Ecology responded that looking at exposure pathways such as the indoor environment is a different study that Ecology is not undertaking at this time even though they recognize the importance of this issue. Ecology also explained that they can address exposure to PBDEs either through limiting contact through products already in use in the home or not allowing PBDEs to be put into new products. Health is currently creating a plan for

avoiding exposure to PBDEs in one's home. The CAP also recommended that Ecology not close its eyes to what is happening to products at the end-of-life. Ecology has decided to address in-home exposures and end-of-life as two separate processes. At this point, Ecology is focusing on end-of-life practices for certain PBDE-containing practices and the potential for releasing PBDEs into the environment. Ecology is leaving home exposure out of its current process as well as recycling and reuse of carpet and furniture. Ecology had to intentionally narrow its focus since PBDEs are found in so many products and resources are limited. Ecology will only address carpet-related end-of-life practices as they relate to landfilling. Marc reiterated that this current committee is only concerned with end-of-life issues; not in-use. He sensed that some members think it is ok for Ecology to narrow their focus and that some are not in agreement. He wanted to make sure that all members at least understand Ecology's plans.

- **Has Ecology confirmed that the United States is not producing any more penta and octa?** A committee member responded by saying that, to the best of her knowledge, penta and octa are not produced anywhere in the world. She recommended that Ecology contact the actual manufactures to confirm that that is true.
- **Is it possible that Ecology could sample materials of concern and still not have answers to how PBDEs are getting into humans' bodies?** Ecology responded yes, this is possible. Ecology also stated that they may not have to sample as they may be able to extract enough relevant data from existing literature. Studies could very well come out and say that there are no risks of PBDE-exposure from end-of-life practices and that dust is the major area of concern for example.
- **What analytical techniques would Ecology use to measure PBDEs?** A committee member asked this question and mentioned that there are no certified labs in the country that measure PBDEs or its congeners.
- **No where else in the world is deca considered a PBT.** Ecology commented that they consider deca a PBT because of its potential to degrade in the environment.
- **Is Ecology proposing to sample?** Ecology responded that they are planning on sampling in order to put the issue into context.
- **In terms of electronics, is Ecology looking to reduce potential releases of PBDEs outside as well as inside Washington State?** A stakeholder asked Ecology if they were looking to protect potential releases of PBDEs wherever they may happen since it is estimated that between 50-80% of electronics are leaving the country to be disposed of or recycled. Ecology responded that, to the extent they could control PBDEs going into new products, they would be protecting people outside and inside the state from potential exposure. Ecology added that the original E-waste bill had a protective clause about off-shore shipping. A committee member clarified that there were some legal issues that prevented some components of the off-shore shipping clause from being in the final signed bill, but that the governor is very concerned with exporting issues and it is very important to look at releases of PBDEs wherever they happen. Another member suggested that this committee could recommend export controls and possibly a ban.
- **Is Health concerned about exposure to PBDEs in schools?** A committee member asked if Health in particular is concerned about schools since children were said to be at higher risk. His understanding is that the literature shows indoor air as more problematic than outdoor air. Health responded that yes,

the agency is very concerned about schools. They are also concerned about pre-natal and neo-natal exposure. Health clarified that the indoor air issue should be called "indoor pathway" not "indoor air." Health's original concerns about PBDEs had to do with diet, but now they are focusing more on the indoor pathway. There is just not enough available data to know how humans are exposed to PBDEs through the indoor pathway.

- **Clarification on expected outcomes.** Marc asked Ecology to clarify their expected outcomes for the advisory committee. He asked if Ecology expects to come up with recommendations to keep recycling in place and reduce the release of PBDEs at the same time. He asked if Ecology is tackling the "low-hanging fruit" at this time. Ecology responded that the four end-of-life areas they have decided to focus on – auto fluff, electronics recycling, landfilling/incineration, and wastewater treatment/biosolids – are the practices where literature indicates that there is a likelihood of PBDEs being released into the environment. Later on in the meeting Ecology will share what they know and what they do not know for each end-of-life practice. Ecology excluded some areas of focus because they did not have enough data.

Member Presentations

Marc introduced the members' presentations, the "fun part of the session," and said that each upcoming member requested to present their findings, questions and/or thoughts regarding PBDEs in response to Ecology's open call for this section of today's meeting.

Presenter: Randy Ray, Pacific Seafood Processors Association

Randy Ray wanted this opportunity to give a presentation based on a variety of scientific studies regarding PBDEs (Attachment 4* - Member Presentations-Randy Ray). He based his presentation on documents that Ecology had gathered on PBDEs in food and house dust. He explained that some of the information from his presentation would be in Ecology's forthcoming white paper. His goal was to review all scientific available on PBDEs and proceeded to quickly present multiple studies.

Randy touched on the issues of PBDEs in biosolids and fish. He shared some of the concerns about high concentrations of PBDEs in biosolids which are then sometimes spread on forest land near fish streams. He explained that PBDEs are found in different types of fish in different levels. PBDEs are also found in other food products. Randy is concerned about PBDEs only being related to fish when people talk about food contamination. He is afraid that mothers and children are being scared away from healthy, fish-containing diets because of PBDE concerns. He expressed that there are issues with PBDEs but that they can be reasonably managed and should not prevent people from eating fish at this time.

Advisory committee members had the following comments and questions on Randy's presentation:

- **Health clarified parts of the presentation.** A Health representative clarified that much of Randy's presentation came from an EPA presentation given to scientists. He explained that Health always starts its public outreach by encouraging people to eat fish, and that the data Randy showed is not necessarily out in the public.
- **Concern with the negative outlook on biosolids.** One committee member mentioned that he thought Ray had overlooked a lot of data that was

presented at the last meeting about PBDEs and biosolids. He stated that most biosolids in Washington State are not actually spread on forest land. He expressed concern with the picture that Randy was painting. Randy responded that he hoped the committee could have further scientific discussions before coming up with any conclusions.

- **Similarities between fish and breast milk.** One committee member commented that she sees strong similarities in issues of concern around PBDEs in fish as she does in breast milk. The environmental community is working very hard with advocates to present pro-breast milk messages. She would like to work on further pro-fish messages too.

Presenter: Richard Gimer, Carpet Cushion Council

Richard Gimer presented information (Attachment 14*) about bonded carpet cushion with the goal of clarifying some issues that came up at the first end-of-life meeting. He explained that the Carpet Cushion Council has been testing new bonded cushion since penta was banned and that more data has come in since the last committee meeting. The mean content of penta in bonded cushion is 0.106%. States that have banned penta have a .1% content level standard. Cushion is broken down into smaller pieces and recycled into different types of products. There will be varying levels of PBDEs in recycled pieces because of different post-consumer materials that are bonded together into recycled cushion. Looking at the amount of penta that is involved in making recycled bonded cushion, the levels meet the .1% goals. In higher density bonded materials that manufacturers are accustomed to using, some of the levels will be higher than .1%. The only way to decrease penta levels is to limit the amount of post-consumer content that bonders can use in their materials. Richard reiterated that bonders are not using penta in their product; they are using post-consumer scrap.

Richard mentioned a study from Duke University about penta levels in dust in which blood serum tests were being run on workers in foam facilities. Preliminary results show that there is no difference in levels of penta in workers as compared to their spouses who do not work in the facility. Industry is cooperating with providing volunteers for the blood serum tests. Richard mentioned that the Carpet Cushion Council is the #1 source for any information on penta in cushions in the nation. The council is obligated to provide periodic testing and an annual report of penta content in materials. Ultimately, if decisions are made that disallow recycling of carpet cushion, this will affect the bonding process and products. The Carpet Cushion Council is very interested in this issue and glad to be a part of Ecology's advisory committee.

Advisory committee members had the following questions on Richard's presentation:

- **What is the new flame retardant that industry is using in its bonded products?** A committee member asked what flame retardant is being used instead of penta in bonded products. Richard responded that current flame retardants are non-brominated and not made from PBDEs. He is not sure if they are phosphate-based. He explained that most furniture foam producers stopped using PBDEs entirely in 2004.
- **Where are flame retardants coming from in carpet cushion?** Richard reiterated that flame retardants are not used in the bonded cushion process. PBDEs are a by-product from the bonding process of using post-consumer materials; they are not added in separately to bonded products.

In-Depth Discussions

Carol Kraege introduced the in-depth discussion section by explaining that Ecology wanted to have experts share details about the four end-of-life priority areas and then follow each presentation with Ecology's findings about quantities of PBDEs from each particular process, pathways, concerns and potential options for management practices. Ecology is not suggesting that their list of options is complete; they are simply offering a starting point for brainstorming and prioritizing options with the committee. Cheri Peele (Ecology) will follow each in-depth expert presentation with Ecology's summary of information.

Topic: Recycling Auto Fluff

Jim Jakubiak, Schnitzer Steel

Jim presented on the specifics of auto recycling operations from their processing facility in Tacoma, Washington. The Tacoma facility is an iron recycler that accepts scrap metal iron from multiple states (WA, ID, UT, OR, AK, MT). Metals are sheared, shredded or torched. Their shredder can process an automobile in about 30 seconds, producing what is referred to as "auto fluff." Automobiles are banned from landfills in Washington State which is why they need to be recycled at the end of their lives. Schnitzer's entire 26 acre Tacoma facility is capped with concrete and incorporates BMPs for controlling water pollution. After the last committee meeting, they have been cooperating with Ecology and EPA to sample auto fluff. Schnitzer's goal is to submit a sampling plan to Ecology in the next few weeks with the hopes of having results by the end of the summer. Jim explained that once automobiles are shredded the fluff comes out wet and it is then treated with cement and sodium silicate. He said there are three shredders in Washington State and they are the only one that treats their fluff. The local health department requires treatment before auto fluff goes to the LRI landfill in Pierce County, Washington. Jim estimates that their Tacoma facility processes approximately 10,000 tons per month. He explained that Ecology suspects that carpets, foams and dashboards in automobiles contain the PBDEs. Along with Ecology, Schnitzer hopes to identify PBDE sources and then take the appropriate actions. Jim passed around an auto fluff sample for the committee to see.

Advisory committee members had the following questions on Jim's presentation:

- **Have you tested runoff from your operations for PBDEs?** Ecology responded that yes, they have tested runoff for PBDEs, but the results are not in yet.
- **Is treated auto fluff used as landfill cover?** Jim responded that yes, the treated auto fluff is used as landfill cover. Even though the fluff is treated with cement, it is still kind of "fluffy" and does not necessarily prevent anything from flying off or getting through the landfill cover.
- **How does water fit into the shredding process?** Jim responded that materials are wetted during the shredding process. The wastewater goes to the treatment plant.

Ecology's Summary – Auto Fluff

Following Jim's presentation, Ecology presented on what they know about auto fluff and PBDEs in terms of emissions; pathways to air, water and land; potential risks; key uncertainties in data; and potential management options (Attachment 7* - Auto Shredder Residue (summary of information on quantities, pathways, concerns and key uncertainties) – Ecology). Cheri began by stating that the concentration of

PBDEs in auto fluff is unknown. For the air pathway, she identified a UC Davis study that examined ambient air upwind and downwind of an outdoor auto shredder. For the water pathway, she could not find any data in literature. Literature does indicate high use of PBDEs in cars and that PBDEs could potentially enter nearby water from auto fluff piles. Because of the lack of available data however, Ecology's key uncertainties include not knowing enough about the concentration of PBDEs in auto fluff or about release quantities into air or water. Cheri ended with Ecology's potential management options, which include no action or various measures depending on whether PBDEs are found to be released into the air or water runoff from auto fluff operations. Marc reiterated to the committee that Ecology wants feedback on the management options in particular. Are there any other actions that Ecology should consider or any options that do not make sense for Ecology to consider?

Advisory committee members had the following comments and questions on Ecology's Auto Fluff presentation:

- **Is treatment of auto fluff enough to prevent potential emissions into the air?** A Health representative asked if treating the auto fluff as is currently the practice is all that is really needed to prevent possible emissions of PBDEs into the air. Jim Jakubiak responded that perhaps that is enough but that maybe industry could do more.
- **Does Ecology's sampling plan include other operations in the state?** Ecology responded yes.

Topic: Biosolids, Sewage Sludge & Wastewater Effluent

Kyle Dorsey, Northwest Biosolids Management Association

Kyle began his presentation by acknowledging there is a lot of controversy around the topic of biosolids (Attachment 5* - Biosolids uses and practices - Kyle Dorsey). He hoped to clarify the process in Washington State by looking at how biosolids are made, how much is made, how they are currently used and how they are beneficial. Biosolids have to be produced in the wastewater treatment process; there is no way not to produce biosolids. Kyle described the clarifying, digesting and dewatering processes that biosolids go through before they are ready to be landfilled, incinerated or land applied. Washington State generates about 115,000 dry tons of biosolids each year and 92,000 tons are land-applied, mostly on agricultural lands. Biosolids are also applied to drastically disturbed sites such as surface mines or lands where topsoil has been removed, or can be used in landscaping products purchased by homeowners or professionals (such as GroCo and TaGro).

Kyle explained that we know there are PBDEs, as well as other pollutants, in biosolids, but that levels may be fairly low and/or acceptable depending on the end use. Biosolids used in residential products such as TaGro for example go through intensive testing and management processes. Washington State University has conducted many studies comparing biosolids to typical commercial fertilizers. Crops tend to do better in biosolids. Kyle is not trying to persuade people to use or even like biosolids, he is simply trying to clarify the topic.

Advisory committee members had the following comments and questions on Kyle's presentation:

- **How often are biosolids required to be tested?** Depending on the size of the plant testing varies from once per month to once per year.

- **Are biosolids considered to be a fertilizer or soil amendment?** Kyle explained that biosolids add organic matter and improve soil conditions. In those respects, it is a considered an amendment.
- **How do Washington's biosolids practices compare with other parts of the country?** Kyle responded that Washington's practices are similar to what takes place in other parts of the country. The majority of biosolids are land-applied to agricultural lands.
- **Are applications of biosolids related to PBDE levels showing up in rural areas?** One member asked if anyone thought that PBDEs in rural areas could be related to biosolid applications on nearby agricultural lands. Kyle responded that the committee needs to keep the amount of biosolids that are being applied in perspective. Currently, biosolids are being applied to less than 1% of agricultural lands in the state. The committee member would like to see more research done on the issue.
- **What are the take-home messages for the committee about PBDEs and biosolids?** One committee member asked Kyle to summarize his messages on PBDEs and biosolids. Kyle responded that there is not a lot of data on PBDEs in biosolids. There is some national information but not a lot for Washington State. His honest assessment is that the low amount of PBDEs in biosolids does not add up to a high cause for concern.

Ecology's Summary – Biosolids

Cheri presented Ecology's findings on PBDEs and wastewater treatment (Attachment 6* - Wastewater treatment (summary of information on quantities, pathways, concerns and key uncertainties) – Ecology). Cheri explained that there is not a lot known about the quantity of PBDEs in influent or effluent. There are more studies on PBDEs in sewage sludge and biosolids. Cheri explained that sludge is everything solid-related that comes out of the treatment process and then biosolids are treated further (as Kyle explained) to meet certain standards and regulations. Cheri stated that it is more likely to find penta and octa in the effluent and deca in the sludge. Ecology has many key uncertainties when it comes to PBDEs and the wastewater treatment process. Potential management options include no action or a variety of actions such as pretreatment options and/or stronger regulations depending on whether PBDEs are found in effluent or biosolids.

Advisory committee members had the following comments and questions on Ecology's Wastewater Treatment presentation:

- **Recommendation to set same standards for all wastes that potentially contain PBDEs.** One committee member expressed his concern that PBDES are bioaccumulative and that this means potential contamination is compounded as biosolids are applied year after year. He pointed out that Ecology recommended regulating water effluent from the auto fluff recycling process as dangerous waste as one of its management options. He commented that Ecology should set the same standards for wastewater treatment effluent and biosolids if they are found to have the same PBDE levels. He recommended treating biosolids and effluent as dangerous waste if they designate as such. Kyle responded that designating as dangerous waste is an unrealistic option.
- **Is there an air pathway from application of biosolids?** Ecology responded that since we do not have incinerators for biosolids in Washington State then we do not have any information on stack emissions, but yes, an air

pathway does exist. Ecology will need to look at the air pathway from spraying of wet biosolids.

- **How will Ecology know what levels of PBDEs they are looking for?** Ecology responded that they do not currently have enough data to know what levels are acceptable or not and that is why one of the potential management options is to ask EPA to set levels.
- **End-of-life issues are complicated**. One committee member commented that these end-of-life issues are each complicated and even more so when considered altogether. There are consistency issues, expenses, etc to consider. It seems as though the recommendation this committee should come up with is stopping the problems of PBDEs at the source. There do not appear to be any good end-of-life solutions. Her sense is that the conclusion at this point should be to shut off the problem at the spigot. Another committee member disagreed.

Topic: Electronics Recycling

Craig Lorch, Total Reclaim

Craig presented a brief photo tour of Total Reclaim's electronics recycling operations (Attachment 8* - Electronics recycling practices - Craig Lorch, Total Reclaim Inc). As recyclers, they do not necessarily know what types of plastics they are processing. Total Reclaim's 2005 report stated that 13 million pounds of electronics were brought in that year. They try to do as much hand-dismantling as possible and then they run materials through mechanized processes (shredder). Separated components, i.e. metals and glass, are sold to various markets. Plastics are consolidated into large tubs and baled. Plastics are now a sought-after commodity. Commodities are exported for the most part. Leftover materials are run through the shredder.

Advisory committee members had the following comments and questions on Craig's presentation:

- **Discussion around worker exposure.** One committee member asked if Craig had looked at issues of worker exposure. Craig responded that he has not done any sampling on employees. He explained that precautions and protection equipment are used in his facility. OSHA's expectations are that a facility will engineer out a problem before implementing protection equipment. In Total Reclaim's lamp-recycling operations for example, they keep mercury levels down but also encourage workers to wear respirators.
- **What happens with their shredded product?** Craig explained that their shredded product goes to precious metals recovery facilities. There are significant amount of metals in shredded product.
- **How much waste goes to disposal at end?** Craig responded that for the most part, particle boards from television sets and console televisions are the only materials they dispose of at the end of processing.
- **Do flame retardants add value to the electronics recycling process?** Craig said flame retardants do not add value to his products, but he is not sure if they add value to the products the plastics are turned into. Some plastics are turned back into data boxes, window protectors, etc.
- **What health effects has Craig observed in his workers?** Craig responded that he does not have any direct experience with health effects from exposure to toxins in his workers. With regards to mercury, Craig monitors employees, conducts urine testing every 6-month, and tests the air

in the room 3 times per day. They do a lot of oversight on mercury because it is found in higher concentrations in their industry and more is known about its toxicity. Health commented that it is not unusual not to notice health effects from exposure to certain toxins such as mercury as the effects include lowered IQ and other conditions that are difficult to identify. A committee member asked Craig if he thought he might be required to do PBDE testing on his employees in the future. Craig said that yes, he could see conducting additional tests in the future. He strives to be a responsible employer and create a safe work environment for all.

- **How would banning a particular component such as deca affect the electronics recycling industry?** One committee member asked if banning deca would affect the recycling of plastics into other products. Craig responded that there are so many plastics being produced all over the world that it is very difficult to know what the impacts would be if there were any. He commented that on the global scale, anything Washington State does alone will not really matter. Banning deca in Washington State alone, without having a national or global ban, may or may not make a big difference in the scheme of things. Craig explained that end markets are more reliant on prices of oil, cost of virgin materials, etc. If Ecology determines that plastics with PBDEs are hazardous and need to go into the landfill instead of being recycled, that will impact local markets and costs. Another member disagreed with Craig's sentiments that a Washington State ban would not affect other parts of the nation or globe. She stated that there would be a significant ripple effect if a ban started here. Craig agreed and clarified that the flow of materials from the US to Asia however may not be strongly impacted. The member disagreed and thought there could very well be a global impact. Another member expressed her excitement at the opportunity Washington State has to create a ripple effect by banning deca.
- **What measures does Craig take to identify the different plastics and streams that come into his facility?** Craig responded that is very difficult to tell if products have flame retardants in them or not. He tries to identify the different types of materials and create a stream that is uniform enough for the buyer. Craig sorts plastics according to color and that is the best they can do. Buyers can deal with some levels of inconsistencies as they reblend outputs into other materials.
- **What is Craig's take-home message regarding PBDEs and electronics recycling?** Craig commented that it may really be an issue for the legislature to figure out if electronics are waste products that need to be regulated differently than currently practiced.

Ecology's Summary –Electronics Recycling

Cheri presented Ecology's findings regarding PBDEs and electronics recycling (Attachment 9* - Electronics Recycling (summary of information on quantities, pathways, concerns and key uncertainties) – Ecology). She began by stating that concentration levels of PBDEs in electronic products and their emissions are unknown. According to some data, concentrations of PBDEs vary quite a bit according to manufacture date. Potential risks from PBDEs in electronics appear to be to workers or directly to the air. One Swedish study found elevated PBDE levels in electronics recycling workers that decreased once the shredder was moved outside. Ecology's potential management options include no action to various technological fixes depending on whether they find that PBDEs are released to outdoor or indoor air.

Advisory committee members had the following comments and questions on Ecology's Electronics Recycling presentation:

- **Lack of data appears to be the biggest problem at this point.**
- **Regulations should include manufacturers phasing deca out of products.** One committee member suggested that phasing deca out of products should be the next step. Another member responded that regulations phasing out deca could potentially mean large financial burdens to manufacturers. Another member commented that implementing a ban will not necessarily solve the issues of PBDEs being released into the environment.
- **What is Ecology's intention with their lists of potential management options for each end-of-life focus area?** A committee member expressed concern that this meeting is the first time many of the members have heard the expert information and yet it appears that Ecology has already come up with their recommendations. He encouraged Ecology to wait for input from the committee in order to come up with management options. Ecology responded that these are just potential options and only a starting point for conversation; not a final or comprehensive list by any means. Cheri explained that final recommendations would need to be worked out with experts. Marc added that, from the facilitation point of view, he had urged Ecology to present their draft options as a way of starting conversations with the committee.
- **If Ecology conducts an economic analysis, a member encouraged them to include health care costs from exposure to PBDEs in the cost-benefit study.**
- **Add an education bullet to all potential management options.** A committee member commented that it is important to add education to all options so that employees are educated about why and how to wear masks, etc.
- **Is there a plan to study alternatives to PBDEs?** A member asked what alternatives will Ecology promote using to maintain fire safety if PBDEs are banned. Ecology responded that yes, an alternatives assessment is included in their recommendations.

Topic: Landfilling & Incineration

Jody Snyder, Land Recovery Inc.

Jody presented information on Land Recovery Inc's (LRI) landfilling processes and business practices (Attachment 10* - Landfill/daily cover (using auto fluff) practices - Jody Snyder, LRI Inc). She described LRI as a 160 acre landfill that accepts municipal solid waste. LRI took 13 years to permit and opened in December 1999. Their liner system costs about 300,000 per acre. There are multiple systems in place to control and reduce stormwater runoff and to make sure that the landfill cover (either daily, temporary or permanent) is appropriate and effective at controlling pollution. The working face of the landfill requires 6 inches of landfill cover on daily basis. Daily cover does not adversely impact leachate emissions. Auto fluff is accepted as daily cover at this facility. Stormwater is diverted to a pond. If rain hits solid waste at any time (i.e. anything other than the plastic cover), it is treated as leachate.

Each cell is designed to collect liquid leachate and extract gas in its underlying liner. The cell liner is built on the natural glacial till. The bottom of each cell is sloped.

Underneath the slope there is a monitoring system to make sure that nothing leaches through. Leachate is collected and pumped out of the landfill. Leachate is moved constantly; it does not just sit under the garbage. LRI has 8 leachate holding tanks on-site. Leachate is gravity fed into trucks and transported to Hidden Valley for pre-treatment and then discharged. There are no open ponds at the LRI facility. Many other rigorous environmental protection measures are in place at this facility. LRI prides itself on being a good neighbor.

Advisory committee members had the following comments and questions on Jody's presentation:

- **Is contaminated soil used in daily cover?** Jody responded that yes, some petroleum contaminated soil and otherwise non-clean soil is used as daily cover.
- **Can stormwater get into closed cells?** Jody explained that there are different stages of cover: daily cover, temporary cover and final cover. Soil is placed over the final cover. Water can get into the soil but cannot get into the closed cell. Stormwater that comes through the final soil cover on top is considered stormwater, not leachate. Leachate is still generated within cells years after a cell has been closed. This is because there is enough moisture inside to create leachate. Monitors see a decline in generation of leachate within closed cell over the years.
- **Has LRI ever tested for PBDEs?** Yes, Jody explained that LRI just recently sampled its leachate for PBDEs. They are still processing the results so she cannot share any details today. It is nice to get data themselves before necessarily being asked to do so. Marc asked if LRI tests its air as well. Jody responded that they do not have an air monitoring device onsite but they do have to follow strict regulations for PSCAAA.
- **How long can a cell have daily cover before putting on a final cover?** Jody responded that daily cover is typically covered the next day with a layer of waste. If they are not going to come back to that area with more waste for awhile, they will put a plastic (temporary) cover on top. They will never leave auto fluff as top cover for long period of time. They follow a very stringent and comprehensive filling sequence plan.
- **Is a closed system for managing leachate typical?** Jody explained that some places use ponds but that is not very common. Wenatchee and Oregon landfills still use ponds, but the closed system is a typical design element. The liner monitoring system however, is unique to LRI. LRI wanted to be able to monitor more closely and be more proactive to prevent leachate than is typically done in field.
- **Do landfills experience spontaneous combustion?** A committee member explained that sometimes transfer station trucks catch on fire due to spontaneous combustion. He wondered if that ever happens at LRI. Jody responded that sometimes they observe "hot spots" with steam coming out and they dig into them to see what is going on. Flames are not common.

Ecology's Summary – Landfilling & Incineration

Cheri began her presentation (Attachment 11* - Solid Waste (summary of information on quantities, pathways, concerns and key uncertainties) - Ecology) by stating that there is no Washington State data on emissions of PBDEs from landfills or incinerators to air, land or water. There are also unknown quantities of PBDEs being disposed of, and currently in, landfills. Cheri attempted to approximate the percent of total municipal solid waste that might contain PBDEs according to a 2003

waste composition analysis of Washington State's wastes. She estimated that approximately 360,000 tons (6.5%) of waste in the state may contain PBDEs. She explained that there are 16 active landfills in Washington State and one incinerator. There is no literature on the air pathway from landfills. There is one study from British Columbia on PBDE concentrations in groundwater and three studies (outside of Washington State) that looked at PBDEs in landfill leachate. Key uncertainties exist about the concentration of PBDEs in leachate, and in sludge or effluent that comes from treated leachate, as well as the impact of auto fluff as daily cover on emissions into the air and leachate. Ecology's potential management options include no action or additional landfill requirements depending on whether PBDEs are found to be released into the air from the landfill's open face. If PBDEs are found to be released into leachate, Ecology's management options include sending leachate to a dangerous waste landfill, requiring pretreatment, requiring all PBDE-containing waste go to an incinerator, or no action.

Advisory committee members had the following comments and questions on Ecology's Landfilling & Incineration presentation:

- **Does Ecology have information on the percentage of PBDEs in certain products?** Ecology responded that the CAP may have a chart with percentage of PBDEs in various materials. Ecology also has the estimates in their current presentation that are from the waste categorization information for the state. A committee member suggested that Ecology make it clear on their waste characterization chart that they do not have detailed information on the amount of PBDEs in the materials; they only have rough estimates.
- **What does it mean when some landfills send zero gallons of leachate to wastewater treatment plants?** A committee member asked a question about Ecology's slide that shows two of Washington State's four largest landfills do not report sending leachate to treatment plants. A committee member responded that Roosevelt and Columbia Ridge recirculate their leachate and then use it to water their piles in a closed-loop system.
- **Clarify Ecology's management options if PBDEs are found to be released in leachate.** A committee member asked if, in their management option stating "send all leachate to a dangerous waste landfill," Ecology means they will take this action if low levels, i.e. 1ppm or 1ppt, of PBDEs are found. Ecology clarified that they need data before they can recommend any management options. They have to define the problem first.
- **Would like to see that no PBDE-containing materials be allowed in unlined facilities.** Multiple committee members commented that they do not want PBDE-containing materials ending up in unlined landfills.
- **Disagreement with Ecology's option that would require all PBDE-containing waste to go to an incinerator.** Multiple committee members disagreed with Ecology's option about requiring all PBDE-containing wastes go to an incinerator. One member commented that incineration poses more problems and is a dangerous solution. Another member stated that she thinks only inert wastes should go to incinerators.
- **Discussion and disagreement around Ecology establishing standards.** A committee member commented that for each end-of-life area Ecology will find PBDEs. Ecology will need to clarify acceptable levels of PBDEs. Ecology responded that they recognize the need for standards so that there is a way to quantify acceptable levels. However, creating standards is very complex. Ecology reiterated its position that PBDEs are PBTs and that any on-going release poses a problem. That is why Ecology has decided to look at end-of-life practices and technologies that are already in place in order to identify

opportunities for reducing levels, regardless of where the levels start. Ecology does not think they will be able to come up with specific numbers or levels that are acceptable. Multiple committee members commented that this gets back to the question of whether or not PBDEs are a problem in the first place. There was disagreement in the room of whether or where there is a problem. Another committee member questioned whether Ecology can go forward with this process without creating standards or conducting additional research. He expressed concern about making any recommendations with such limited data. Another committee member commented that it is very difficult to establish acceptable levels or numbers for PBTs. She does not agree that Ecology needs to establish standards or levels in order to move forward with the process. Another member added that, if Ecology does not set levels or standards, it will be very difficult to monitor success. She asked how Ecology plans to quantify how decreasing levels of PBDEs would positively impact human health.

- **How do dangerous waste landfills better manage their leachate?** A committee member asked this question about dangerous waste landfills in response to some of Ecology's potential management options. Ecology responded that they do not know what happens at dangerous waste landfills, but that they are currently studying the issue.
- **How to move forward with so many gray areas?** A member cautioned the committee about coming up with any policy recommendations because there are so many gray areas. He commented that there is just not enough data about contamination levels or places for real concern. He asked how Ecology plans to evaluate what options make the most sense.

Research Plan & Next Steps

Carol Kraege (Ecology) concluded the meeting with a presentation and discussion around Ecology's proposed research plan (Attachment 12* - Research Plan and Next Steps - Ecology). Carol started with a review of three questions Ecology has formulated as appropriate to address in the next phase of work on this project:

1. What levels of PBDEs are released from each end-of-life focus area?
2. How much removal occurs during pretreatment and treatment?
3. Are technologies available that can cost-effectively remove PBDEs, or improve removal efficiency?

For each of the four end-of-life focus areas, Ecology proposed a variety of studies and sampling in order to respond to the questions above:

- **Auto recycling** – Conduct sampling on waste, waste water, ambient air and surface soils. Costs depend on how many congeners they decide to focus on.
- **Electronics recycling** – Not proposing any direct sampling. Instead, wait for the state to come out with its performance best management practices for recycling operations.
- **Landfills** – Conduct sampling on leachate and air from landfills that use auto fluff and those that do not.
- **Incineration** – No new sampling proposed.
- **Wastewater treatment** – Conduct sampling on influent, effluent and biosolids from facilities that receive leachate and those that do not.

Carol explained that Ecology proposes taking samples over a year's time. All sampling recommendations however, add up to more money than Ecology currently has available. Ecology then has to figure out how to move forward and prioritize its next steps. To do this, Carol reviewed Ecology's recommendations:

- **Apply the best available technology (BAT) approach** - Assess how current technologies are removing PBDEs.
- **Review results from studies now underway** – Ecology suggests not starting their own sampling until they get as many results as possible from studies that have already been conducted. Use existing literature as much as possible.
- **Revise sampling plan as appropriate**.
- **Seek funding to conduct needed sampling**.
- **Collect data sufficient to evaluate BMPS for each priority practice**.
- **Assess BMP alternatives**.
- **Reconvene this committee** - Carol suggested coming back to the advisory committee in fall 2006 with additional data and then plan from there if and/or how to move forward.

Advisory committee members had the following comments and questions on Ecology's Proposed Research Plan presentation:

- **Does Ecology know if the E-waste bill's BMPs will focus on environmental concerns?** A stakeholder commented that the state will begin setting processing standards in September 2006. She is not sure what resources will be available for the state's E-waste committee to focus on PBDEs, and recommended that Ecology's end-of-life advisory committee conduct as much sampling as possible. Many committee members agreed.
- **Is there more than one landfill in the state that uses auto fluff?** A committee member responded that yes, there is at least one more landfill receiving auto fluff.
- **Further discussion and disagreement about Ecology needing to contextualize results.** Members from the business and environmental communities disagreed about the importance of sampling without having standards for comparison. One committee member suggested that all data requires a context, and that without a context, the sampling results may not yield anything meaningful. Another committee member agreed and stated that she would hate to see the public scared if Ecology reports that certain locations have more PBDEs than others if we do not know what the levels mean. Members expressed the need for using caution and not scaring the public with data that is not grounded. Other members disagreed and stated that it is useful to pursue information about current PBDE levels in order to understand the bigger picture of how PBDEs exist in our environment. A member commented that it would be very valuable if Ecology could come up with reproducible results that people can have confidence in. A stakeholder from the audience stated that the committee seems to be stuck and not moving forward. She added that at least one state needs to move forward and stick its neck out to collect data that has not been collected before. Another member agreed and added that she thinks enough science already exists that gives acceptable levels and numbers for PBDEs in various materials.
- **The wastewater treatment industry is poised to do studies and conduct samples.** A committee member stated that wastewater treatment facilities are poised to do studies like these for Ecology, they just need direction. Wastewater treatment has the funding and is willing to test for whatever toxins or levels Ecology comes up with.
- **When Ecology publishes data, they should make sure that units are consistent.** A committee member asked Ecology to make sure their units

are consistent as possible because it is difficult to compare results with units varying so widely.

- **Conversation around prioritizing issues because of lack of funding.** Ecology stated that there is a lack of funding to conduct all of the proposed sampling. Carol asked if it makes sense then to focus on one end-of-life issue, such as wastewater treatment, at this time. Carol asked the committee if partial data collection sounds ok. A committee member responded that she would hate for the committee to make a decision at today's meeting. Multiple members suggested that the committee needs to see Ecology's plan in document format and have time to comment before Ecology should make any decisions. Carol suggested that Ecology will send out the white paper and sampling plan (based on today's feedback) and they will consider whether or not conducting partial samples is adequate.
- **Suggestion to Ecology to add something to scope to test products in the home to learn more about where PBDEs are coming from**.
- **Does the committee want Ecology to set standards?** Carol commented that she is hearing some support for the best available technology approach but also the need for Ecology to set standards. She asked if she was misinterpreting the committee's feedback. A committee member responded that he does not want Ecology to come up with standards, especially because they do not have enough data. He would like Ecology to go forward with data-collection plans. No one supported Ecology developing standards. Marc added that he heard a need for numbers or reference points when conducting sampling but not necessarily setting standards. A committee member commented that Ecology needs to step back and design a methodology for what they are trying to do. This may entail talking with the Governor's office in order to get additional funding. He suggested that Ecology look at this from a planning perspective, not just follow scattered sampling ideas.
- **Marc summarized the committee's recommendations to Ecology:**
    1. Get the white paper out.
    2. Review and revise sampling plan and budget plan.
    3. Share new plan with committee.
    4. Decide what the input process will be at the next meeting.

Wrap Up

Carol concluded by thanking all of the members and department representatives that gave presentations during the meeting. She commented that Ecology would be in touch to let the committee know if and/or when they would conduct their next stakeholder meeting. Marc thanked everyone for participating in such a long and full meeting and reminded people to fill out their feedback forms.

*Attachments can be found on Ecology's website or obtained by email from Mike Gallagher (mgal461@ecy.wa.gov).

Meeting Adjourned